

Docket No.: 52352-767

PATENT NS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

: RESPONSE UNDER 37 CFR 1.116
: EXPEDITED PROCEDURE

Christy Mei-Chu WOO, et al.

Serial No.: 09/826,078

: Group Art Unit: 1765

Filed: April 05, 2001

: Examiner: DEO, Duy, Vu

For: PHYSICAL VAPOR DEPOSITION OF NICKEL

RESPONSE AFTER FINAL

Box AF
Commissioner for Patents
Washington, DC 20231

Sir:

The following remarks are submitted in response to the Official Action mailed October 30, 2002. Claims 4, 5, 7, 8 and 10-15 are now active in this application.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 103

I. Claim 4, 5, 7, 8, 10, 13 and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gupta et al. (hereinafter, Gupta), admitted prior art, and Wolf et al. (Silicon Processing for VLSI Era) (hereinafter, Wolf).

Claims 11 and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gupta, admitted prior art and Wolf et al. (Silicon Processing for VLSI Era) as applied to claim 8, and further in view of Chen et al. (Comparision of TiSi₂, CoSi₂, and NiSi for thin-film Silicon-on Insulator Applications) (hereinafter, Chen).

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Claim 15 is rejected under 35 U.S.C. §103(a) as being unpatentable over Gupta, admitted prior art and Wolf et al. (Silicon Processing for VLSI Era) as applied to claim 8, and further in view of Kunishima et al. (hereinafter, Kunishima).

The Examiner admits that Gupta and Wolf do not describe preheating the chamber, but asserts that page 2 (of the specification) teaches that it is well known to preheat the chamber including sputter chamber, to accelerate the removal of contaminants from the chamber. The Examiner admits also that Gupta and Wolf do not describe heating the chamber during the introduction of the 2nd substrate, but contends that it would be obvious to one skilled in the art that there are more than one [sic] wafers being processed at a time. Since it is desired to preheat the wafer before deposition as taught by Wolf for a sputtering process it would be obvious to keep the chamber heated in order to heat the second coming wafer and remain [sic] the continuous of the hole process. This would save processing time of reheating the chamber and it would [sic] increase product yield.

The rejections are respectfully traversed.

II. As to the rejections of claim 8, and similarly noted in the previous response, the Examiner continues to rely upon mere opinion, not evidence, to establish what would have been obviousness.

The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Examiner. *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). In rejecting a claim under 35 U.S.C. §103, the Examiner must provide a factual basis to support the obviousness conclusion. *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967); *In re Lunsford*, 357 F.2d 385, 148

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USPQ 721 (CCPA 1966); *In re Freed*, 425 F.2d 785, 165 USPQ 570 (CCPA 1970). Based upon the objective evidence of record, the Examiner is required to make the factual inquiries mandated by *Graham v. John Deere Co.*, 86 S.Ct. 684, 383 U.S. 117, 148 USPQ 459, 469 (1966). The Examiner is also required to explain how and why one having ordinary skill in the art would have been led to modify an applied reference and/or to combine applied references to arrive at the claimed invention. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

As to Wolf, it is noted that the preheating referred to in this reference is carried out in a separate pre-processing chamber, and when preheating of the wafer is to improve step coverage during deposition, this "may be done in the sputter chamber *during deposition*". Thus, Wolf teaches using a separate pre-processing chamber for preheating, or performs preheating of a wafer "during deposition" process in order to improve step cover of the deposition process.

However, claim 8 requires, *inter alia*:

heating the deposition chamber with the at least one heating element prior to introduction of a first substrate;
introducing the first substrate to the deposition chamber while heating the deposition chamber with the at least one heating element;
depositing a layer of nickel on the first substrate while heating the deposition chamber with the at least one heating element;
removing the first substrate from the deposition chamber while heating the deposition chamber with the at least one heating element;
introducing a second substrate to the deposition chamber while heating the deposition chamber with the at least one heating element; and
depositing a layer of nickel on the second substrate while heating the deposition chamber with the at least one heating element, wherein
the chamber is heated with the at least one heating element continuously between the removal of the first substrate and the introduction of the second substrate.

The fact that Wolf teaches perform preheating of a wafer "during deposition" process in order to improve step cover of the deposition process in no way suggests that the deposition

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chamber is *continuously heated between the removal of the first substrate and the introduction of the second substrate*. More specifically, there is nothing in any of the applied prior art references which discloses or suggests any reason to provide this continuous heating of the deposition chamber while one substrate is removed and another is being introduced. Given the disclosures of the references it would be assumed heating of the chamber ceases when the processing of a wafer is complete and the wafer is to be exited from the chamber, and that the heating of the chamber remains off until a new wafer enters whereupon, the chamber is closed and heating, including preheating, begins anew. The continuous heating of the deposition chamber while one substrate is removed and another is being introduced is what is taught in the present application, not the prior art.

It should be recognized that the fact that the prior art could be modified so as to result in the combination defined by the claims at bar would not have made the modification obvious unless the prior art suggests the desirability of the modification. *In re Deminski*, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986).

Recognizing, after the fact, that such a modification would provide an improvement or advantage, without suggestion thereof by the prior art, rather than dictating a conclusion of obviousness, is an indication of improper application of hindsight considerations. Simplicity and hindsight are not proper criteria for resolving obviousness. *In re Warner, supra*.

Page 2 of the present specification merely teaches preheating the chamber under vacuum for a period of time prior to sue in depositing materials onto a semiconductor substrate to remove contaminants from the chamber. Given the fact that the chamber needs to be under vacuum, it cannot be said that this is also a teaching of heating the chamber between the exiting of one substrate

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(or group/batch) and the entry of the next substrate (or group/batch) as there would be no vacuum at such time in the chamber.

Reliance upon mere opinion to reject claims is not objective evidence that claims 8, as a whole, is obvious within the meaning of 35 U.S.C. § 103. In addition, reliance by the Examiner on his opinion as a reason why one having ordinary skill in the art would have been led to continuously heat the chamber from prior to entry of the first substrate and also between the exiting of the first substrate (or group/batch) and the entry of the next substrate (or group/batch) to arrive at the claimed invention, is an example of improper hindsight reconstruction of the claimed invention which does not support a *prima facie* case of obviousness under 35 U.S.C. § 103.

Applicants would stress that the requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 is not an abstract concept, but must stem from the applied prior art as a whole and have realistically impelled one having ordinary skill in the art to modify a specific reference in a specific manner to arrive at a specifically-claimed invention. *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989).

Generalizations are legally insufficient to establish the requisite motivation. *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995). However, only generalizations have been used by the Examiner to establish the requisite motivation since no specific teaching of continuously heating of the deposition chamber while one substrate is removed and another is being introduced has been introduced by the Examiner.

It quite telling that after being *challenged* to provide evidence that the prior art recognizes continuous heating of the deposition chamber while one substrate is removed and another is being introduced, the Examiner fails to do so, continuing to rely upon opinion rubric. Clearly, given the fact that it is reasonably presumed that the Examiner would provide a teaching in the

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prior art of continuous heating of the deposition chamber while one substrate is removed and another is being introduced if he had such teaching in his possession, the failure to provide such teaching must result from the fact that the Examiner has no such prior art teaching in his possession. This is a potent indicium of nonobviousness of this (missing) feature of the present invention that, unfortunately, has apparently escaped the Examiner's consideration.

Thus, the Examiner has not factually established the requisite prospective motivation to support a *prima facie* case of obviousness under 35 U.S.C. § 103. *In re Deuel, supra; Uniroyal, Inc. v. Rudkin-Wiley Corp., supra.* See also *In re Zurko*, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001) and *In re Lee*, ____ F.3d ____, 61 USPQ2d 1430 (Fed. Cir. 2002), decided January 18, 2002.

In view of the above, the allowance of independent claim 8, and claims 4, 5, 7 and 10-15, depending from amended claim 8, is respectfully solicited.

CONCLUSION

Accordingly, it is urged that the application is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including

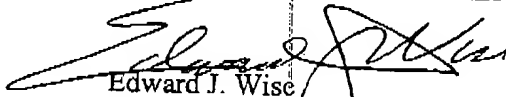
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extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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